



Factory Service Bulletin

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p/a WAALHAVEN Z.Z. 48, 3088 H.J. ROTTERDAM, THE NETHERLANDS

MEMORYMOOG SEQUENCER/MIDI UPDATE

BULLETIN 841A

REVISION DATE: January 6, 1983
SERIAL NUMBERS BELOW 3000
REVISION 4.0up (C,0,ENTER displays 84)
LABOR ESTIMATE: 2 hours
KIT PART NUMBER 997-046090-901

This is a customer option non-warranty update requiring the AUTOTUNE kit as a prerequisite. If the AUTOTUNE kit is being added at the same time, it should be fully tested with its own EPROMs before proceeding with the Sequencer installation. Additionally, the following bulletins are necessary for the best possible stability and reliability: 834, 835, 837 and 838. Before attempting this modification, it is strongly suggested that ANY NECESSARY REPAIRS BE COMPLETED FIRST so that troubleshooting is not complicated by the sequencer update.

MODIFICATION SUMMARY

- 1) SAVE & VERIFY CUSTOMER PRESETS
- 2) POWER SUPPLY UPDATE
- 3) ADD COMPONENTS & NEW BUTTONS TO LSC
- 4) UPDATE DIGITAL BOARD
- 5) UPDATE COMMON ANALOG RESISTORS
- 6) INSTALL SEQUENCER/MIDI BOARD
- 7) UPDATE HARNESS
- 8) INSTALL NAMEPLATE AND OVERLAY
- 9) LOAD CUSTOMER PRESETS
- 10) TEST AND REASSEMBLE
- 11) UPDATE CUSTOMER DOCUMENTATION
- 12) MAIL IN OLD EPROMS

OWNER PRESETS

With the "original" EPROMS installed, SAVE (C,1,ENTER) and VERIFY (C,3,ENTER) the customer's existing presets as your very first step. Ask the customer if he wants his current presets reloaded or the Moog factory presets when the update is completed. Also ask that the Memorymoog Owner/Service manual be left with you for updating. Ask the customer for his four digit code so that the Memorymoog can be "ENABLED". Unless customer gives you the security code to be loaded into unit, the code will be reset to 0000 to ENABLE programs to be saved.

POWER SUPPLY BOARD #13

Remove power supply according to the procedure described in service bulletin 838. Perform modifications contained in the bulletin using parts supplied. DO NOT REINSTALL power supply until LSC board modifications are completed.

LEFT SIDE CONTROL BOARD #7

Disassemble the Left Side Control Board according to the Service Manual Procedure described on page 131. Change R79 from a 220 ohm to the 100 ohm resistor provided. For units with a discrete Power Clear Board, the 220 ohm resistor R79 is located on the solder side of the board and is attached directly to the LFO RATE LED. Also change C28 in the display clear circuitry from a .0047uf to a .01uf capacitor.

NOTE: Be sure all return springs are removed according to Bulletin 839 before proceeding further.

Remove the following WAVEFORM switch buttons in the LFO MODULATION section and replace them with the blank lighter color versions supplied: TRIANGLE, SAWTOOTH, REVERSE SAWTOOTH, SQUAREWAVE, SAMPLE/HOLD and FILTER. Then remove the DESTINATION switch buttons FREQ 1, FREQ 2, FREQ 3, PW 1, PW 2 and PW 3 and replace these with the lighter color versions labeled 1 through 6 respectively.



Synthesizers



Amplifiers



Sound Modifiers



Accordions



Amplifiers



Amplifiers



Amps.

CAUTION: To avoid damaging LED's, remove the switch buttons by pushing them UP using a screwdriver handle from underneath. To reinsert the new plastic buttons, apply firm even downward pressure, being careful not to push too hard causing damage to the contact from an excessive "release" action.

(NOTE: To perform the following check, power supply must be temporarily reconnected to the heat sink.)
Check each switch and LED for proper operation first, then reassemble the Left Side Control Board into its normal position following the procedure outlined in the Service Manual.

If switches do not function properly, refer to bulletin 839. If the left side control board switches function properly, reinstall the power supply.

DIGITAL BOARD #4

Hinge open the Digital Board and Common Analog Board combination. Following the diagrams provided, cut the four traces and add the three jumper wires as shown. Install a 10K resistor and 1N4148 diode/jumper as shown. (The 33K resistor noted is from the earlier Autotune modification requirements). BE SURE THAT THE ADDED JUMPER WIRES DO NOT REST AGAINST ANY PROTRUDING IC LEADS AS A SHORT CIRCUIT COULD DEVELOP when the board is hinged into final position. Leave the boards free after this has been completed, until the harness updates are completed in the issuing step.

Replace EPROMS 1 through 3 and add the additional 6116 RAM into the available U8 position.

COMMON ANALOG BOARD #2

Make sure modifications from bulletins 834 and 837 are installed. In addition, install two 90.9K 1/4 watt resistors supplied in place of R155 and R158 (originally 100K 1/4).

SEQUENCER BOARD #11

Remove the rear panel knock-out plate and mount the Sequencer Board rear overlay panel by reusing two of the three black Phillips head screws. Mount the Sequencer Board using the existing two Keps nuts currently used to mount the Left/Right Side Control Boards. Be sure there is a plastic insulator glued to the mounting bracket as this prevents shorting of the bracket to traces on the control board.

Connect heavy green ground wire of the sequencer board to the large trace marked "U7" immediately in front of U7 on the Digital Board. Scrape away any residual flux with a sharp pointed object, eg. an awl.

HARNESS UPDATE

Reroute the main harness to allow for room for the sequencer board when fully assembled. Follow the diagrams provided. Add the new power supply cable provided by connecting it from the S114 location on the Sequencer Board to the S521 location on the DMUX Board. Be sure wires exit to the left on DMUX board in which the red wire is connected to Pin 2 of S521 and exits AWAY from the jacks on the sequencer board. Route it in with the main harness which crosses the Common Analog board.

Next, remove the brown wire from the red MTA connector at P77-1 on the Left Side Control Board. Pull the brown wire back through the harness so it exits the harness near the P113 location on the sequencer board. Install the new MTA connector at location S113-2 on the Sequencer Board and attach the new white/brown wire into the MTA connector 77-1 on the Left Side Control Board, using firm pressure from a pair of small needle nose pliers. These insulation displacement connectors may of course be attached using the appropriate AMP tool 59803-1 as shown on page 137 of the Service Manual. The brown wire should be similarly connected into S113-3 on the sequencer board. Lastly, install the 40 pin shielded ribbon cable from the S111 sequencer board socket to the S4X socket on the Digital Board. Note that the polarity stripe must coincide with the socket designation for pin 20.

Separate the Common Analog board power supply harness P26 from the main harness by cutting the tie wraps. Route the P26 UNDER the Digital board and route it UP BETWEEN the Common Analog board and Digital boards and into its final position.

Using the supplied plastic "angular mounting clips", attach them to the left rear corner of the Digital Board AND the left rear corner of Voice Card #1 (A). Both clips should be angled UP and extending out to the LEFT of the appropriate board. The gray shielded cable harness from the Voice Cards to P29 should be reattached with a tie wrap to the new "angular clip" at the left of Voice Card #1(A).

The harness to connector P27 of the Common Analog board should be looped around counter-clockwise to place it into final position (ends up left of the connector). The rest of the main harness bundle will be rerouted along the REAR of the Common Analog and Digital boards. At the left rear corner of the Digital Board the new "angular clip" should be used to tie wrap the main bundle and continue routing it along side the power transformer with the other power transformer cables. The large "ball-type" twist lock is also used at this location to group the power supply P131 harness to the main bundle.

Optionally the following ribbon connectors may be rerouted for ease of calibration in the future. Follow the diagrams provided:

Swap end-for-end P22 and P56, fold and reroute ribbon.

Swap end-for-end P21 and P55, fold and reroute ribbon.

Swap end-for-end P45 and P51, fold and reroute ribbon.

Swap end-for-end P43 and P52, fold and reroute ribbon.

Using the six 0.1uf tubular capacitors supplied, solder one to each of the five rear panel jacks positioned on the left side of the Jack Board (RELEASE, HOLD, PROGRAM ADVANCE, PROGRAM BACK STEP and GLIDE) and the sixth to the FOOT PEDAL jack on the Jack Board (see diagram).

Due to the complexity of the Memorymoog harnessing be sure the various cables are not squeezed against the front panel during final assembly. A cable pushing up on the front panel may cause a number of switches to feel excessively stiff to operate. If this occurs, open the Memorymoog and readjust the harness.

CASSETTE LOADING

According to the customer's instructions, load in either his original presets or the new factory presets provided. In any event, after loading the appropriate 100 presets, proceed to the sequencer portion of the factory tape and following the new Owner's Manual addenda, LOAD the sequence tape by hitting (C,2,ENTER), then when "B IF SEQ" is displayed, hit (B). Remember, hitting ENTER loads the programs.

NAMEPLATE AND OVERLAY INSTALLATION

Add the new Memorymoog Plus nameplate by first carefully removing the old nameplate. Protect the wood with a suitable material and pry up the right hand edge.

Clean the MODULATION segment of the original overlay to remove any surface contamination (finger oil, etc.) with denatured alcohol. Add the new overlay to the front panel by peeling off the backing material. Hold it at the sides and directly over the original LFO MODULATION overlay. Carefully line up the new overlay over the existing overlay, using a very slight side to side oscillating motion, until it is exactly positioned. Next push down firmly around the LEDs and switches and smooth out the remaining areas, working towards the extremities.

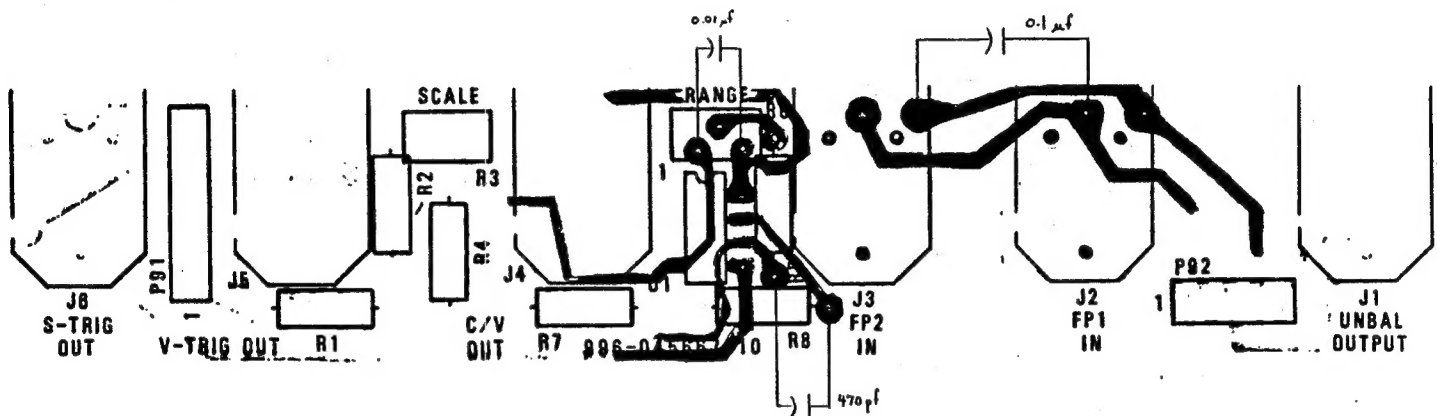
TEST AND REASSEMBLE

Test and adjust the Sequencer Board. The complete test procedure is listed below for future reference.

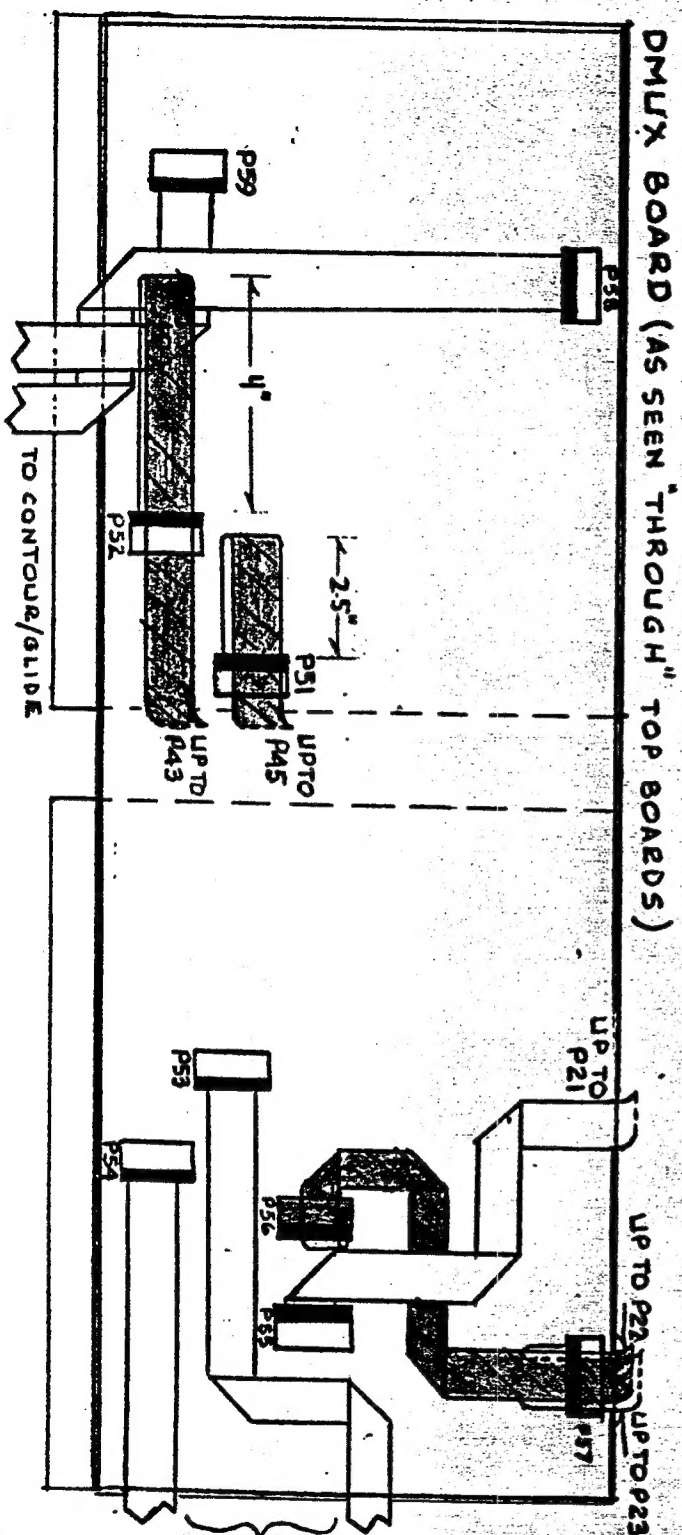
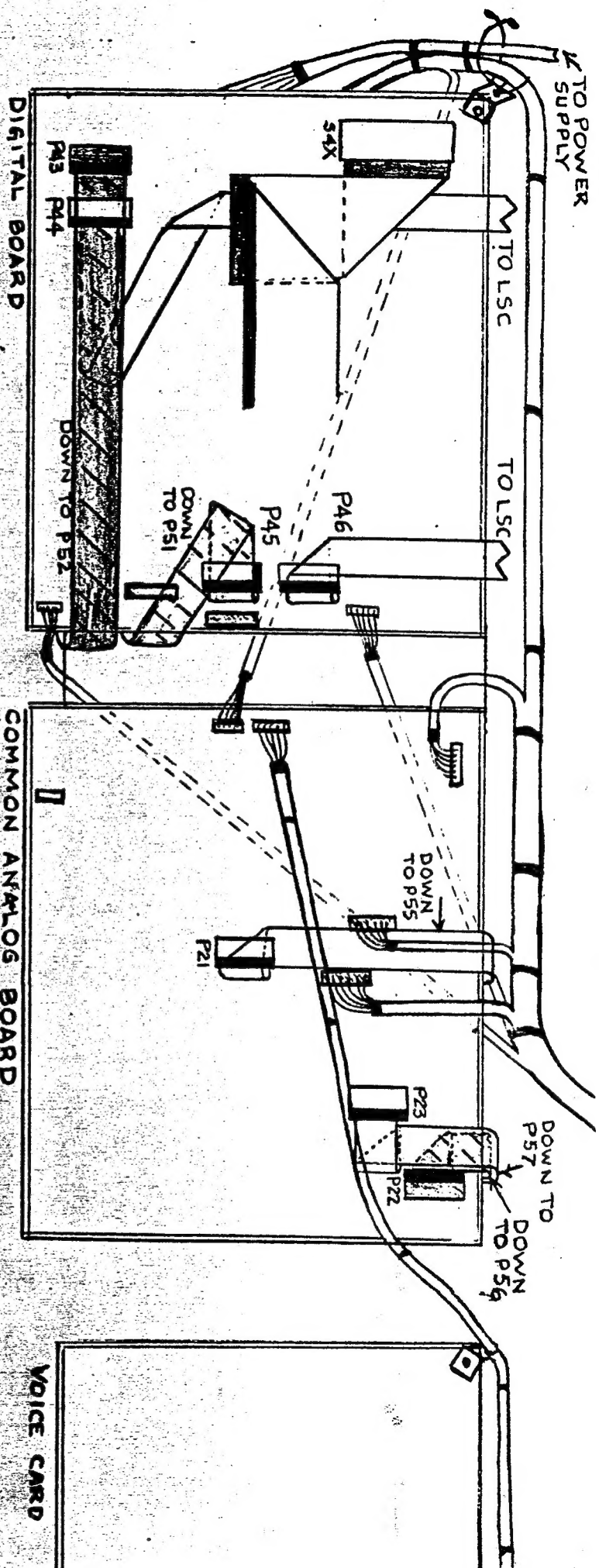
Reassemble in the usual manner, however, use the three (3) blunt phillips-head screws provided for the rear panel. These avoid a possible short circuit to the new harness position.

Correct the schematic for: the LSC board new connector designations for the P77-1 to P113 to P25-6, the digital board and common analog board changes. Give the owner the additional owner information and add the provided schematic in with this bulleting to the schematic section of the manual.

PLEASE fill out the enclosed sheet for our computer file. Be sure to mail back the old EPROMs in the envelope enclosed and IN THE ANTISTATIC BAG PROVIDED along with the installation notice to insure an appropriate refund or credit to you or your account.

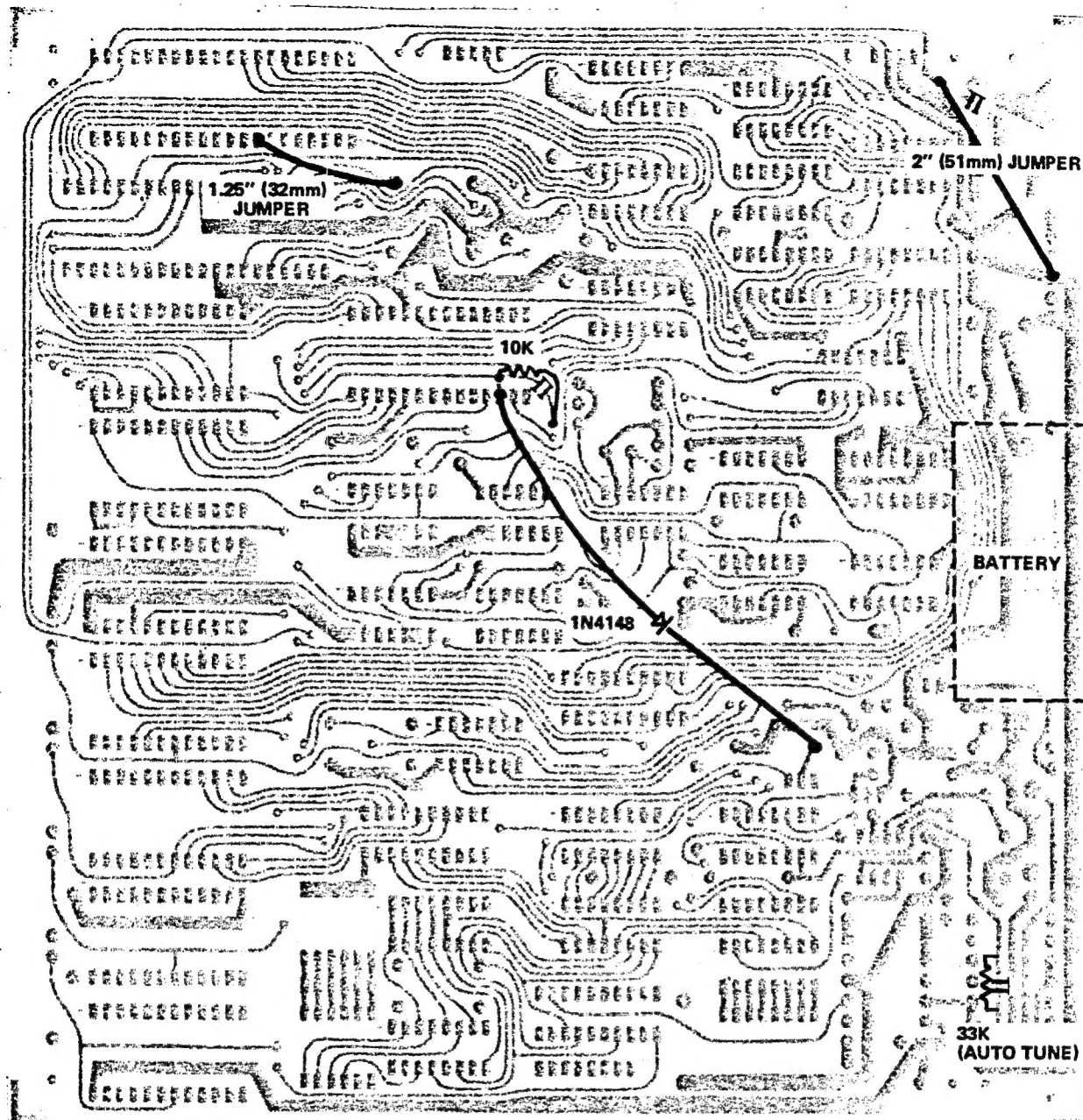


JACK ASSEMBLY PRINTED CIRCUIT BOARD (BOARD NO. 9)



**SHADED RIBBONS
HAVE BEEN
REVERSED**

SEQUENCER MODIFICATION
UNDERSIDE OF DIGITAL BOARD NO. 4
OPEN POSITION

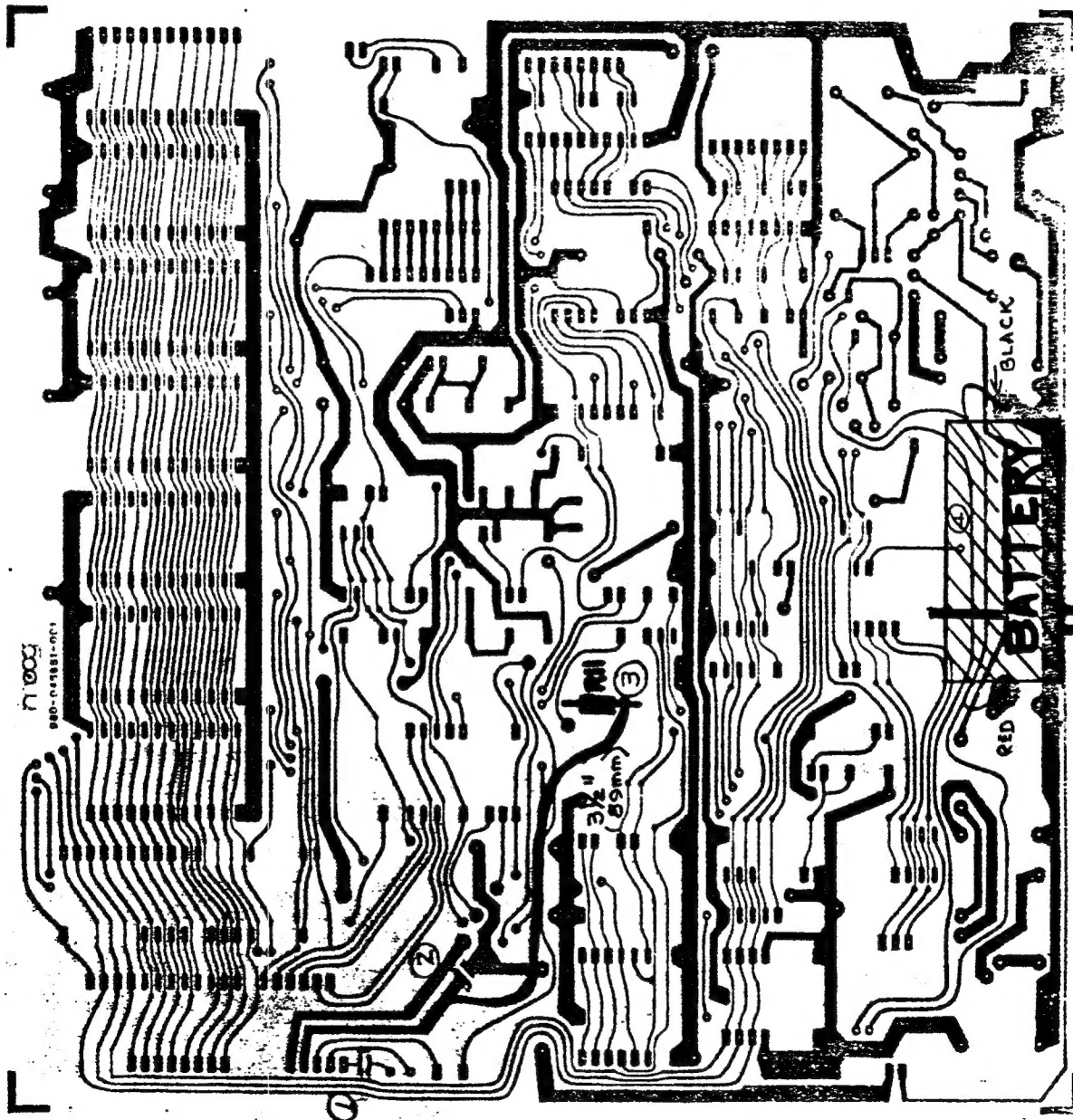


SEQUENCER RETROFIT

Underside of Digital Board

"OPEN POSITION"

- ① Cut trace from U24 "out" to Pin 2 of S4X.
- ② Add 2" jumper to trace from Pin 2 of S4X to VRAM trace at CR4.
- ③ Add 1.25" jumper from Pin 28 of S4X to plated through hole connected to Pin 17 of U1.
- ④ Cut trace between Pin 17 of U10 and plated through hole near Pin 15.
- ⑤ Add 10K across this trace cut (4 above).
- ⑥ Add 1N4148 diode/jumper from Pin 17 of U10 to side of R15 nearest battery.



SEQUENCER RETROFIT

Component Side of Digital Board

"Closed Position"

- ① Cut trace leading from S4X Pin 20 to plated through hole.
- ② Cut wide trace from Pin 17 which exits under S4X before it "y's" to C32 and C23. Verify P17 with an ohmmeter.
- ③ Add 3½" jumper from bottom of R11 to Pin 17 of S4X
- ④ Parallel battery leads if necessary.

o MEMORYMOOG SEQUENCER TEST PROCEDURE

Add this procedure following page 146 of the Service Manual

1. Load Cassette Sequences (if necessary) by:
Hitting C,2,ENTER. Display will momentarily read "C LOAD" and then "B IF SEQ". Hit B to load sequences. Display reads "SEQUENCE" prior to loading of cassette sequences.

2. Enter Sequencer mode:

Hit C,C,ENTER. Display now reads "SEQUENCE" and the POLY and SEQ LEDs should be ON. If the display reads "**MOOG*" just hit C,C,ENTER again to "toggle" the display to read "SEQUENCE".

NOTE: C,C,ENTER switch action enters or exits the sequencer mode.

3. Sequencer RATE calibration:

Hit SEQ/MRGl, then START.

Set the front panel RATE control to 50% (12 'clock).

Connect an oscilloscope or a frequency counter to the side of R26 marked "R26" on the SEQUENCER board. A 10X probe is advisable to prevent loading the rate oscillator resulting in erroneous readings.

Adjust trim R47 for 2918 Hz (342us) to 3226 Hz (310us) nominally 3072 Hz (325us) if necessary.
Hit STOP.

4. Sequencer jack test:

Connect a footswitch to the CLOCK IN jack, and set the rear panel CLOCK RATE switch to the STEP position. Footswitch operation may be simulated by means of a 1/4" guitar cord connected to a normally open momentary switch.

Hit SEQ/MRGl, then START.

Depress the footswitch several times to partially step through the sequence and verify by using the audio output. Disconnect footswitch.

Hit STOP, then START.

Reconnect the footswitch to the CLOCK DISABLE jack and connect an oscilloscope to the CLOCK OUT jack. Verify a +5 volt pulse with a nominal duty cycle equal to 100 USEC. Verify that the clock is disabled when the footswitch is depressed. Disconnect footswitch and oscilloscope.

Hit STOP.

Next connect the footswitch to the START/STOP jack. Depress footswitch to START the playback of sequence 1.

Connect an oscilloscope to the CLICK OUT jack and verify a +5 volt pulse with a nominal 1msec. duty cycle.

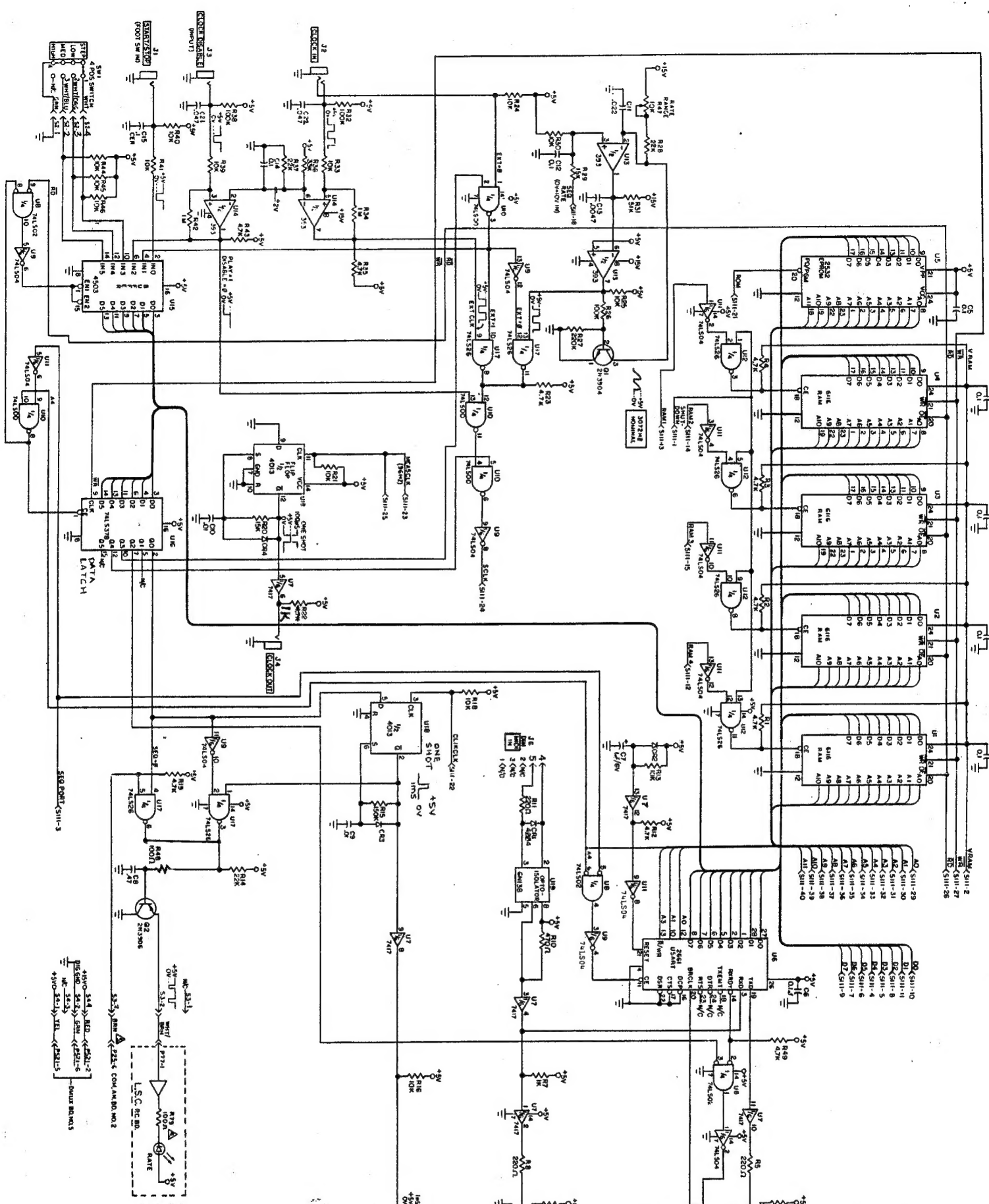
Depress footswitch to STOP playback.

Disconnect footswitch and oscilloscope and the test is completed.

996-046090-901 SEQUENCER BOARD #11

REF DES (QTY)	PART NUMBER	DESCRIPTION	TYPE/USE
(1)	913-045588-007	OVERLAY, 6.9 X 7.8", SEQUENCER	FRONT PANEL
(1)	963-046094-001	REAR PANEL, SEQUENCER, ALUMINUM	INTERFACE PANEL
(2)	904-041406-010	WASHER, FIBER #6 X 5/16" OD	REAR PANEL
(2)	902-041450-001	NUT, HEX, 2MM ZINC, METRIC	SWITCH MOUNTING
(2)	903-041449-001	MACHINE SCREW, 2MM X 5MM, METRIC	SWITCH MOUNTING
(2)	904-040495-001	WASHER, LOCKING, #2 NICKEL	SWITCH MOUNTING
(1)	910-046058-003	HEADER, CIS, .1" CTRS. LOCKING	3 PIN
(2)	910-046058-004	HEADER, CIS, .1" CTRS. LOCKING	4 PIN
(1)	910-045895-004	HOUSING, MTA, RED	4 PIN 22 AWG
C1-C6	947-045183-104	CAP,CERAMIC, MONOLITHIC 20% 50V	.01 UFD
C7	945-044465-005	CAP,ALUM ELECTRO +80% -20% 50V	1 UFD
C8	946-041978-474	CAP,POLYESTER FILM 10% 50V	.47 UFD
C9-C10	947-045011-103	CAP,CERAMIC TUBULAR +80% -20% 50V	.01 UFD
C11	946-041978-223	CAP,POLYESTER FILM 10% 50V	.022 UFD
C12	946-041978-472	CAP,POLYESTER FILM 10% 50V	.1 UFD
C13	947-045008-472	CAP,TUBULAR 10% 50V	.0047 UFD
C14-C15	946-041978-104	CAP,POLYESTER FILM 10% 50V	.1 UFD
C16-C20	947-045183-104	CAP,MONOLITHIC, CERAMIC 20% 50V	.1 UFD
C21-C22	946-041978-473	CAP,POLYESTER FILM 10% 50V	.047 UFD
CR1-CR4	919-041075-001	DIODE, SIGNAL, SILICON	IN4148
J1	910-045552-001	RIGHT ANGLE JACK, PHONE 2 COND	START/STOP
J2	910-045552-004	RIGHT ANGLE JACK, PHONE 3 COND	CLOCK IN
J3	910-045552-001	RIGHT ANGLE JACK, PHONE 2 COND	CLOCK DISABLE
J4	910-045552-001	RIGHT ANGLE JACK, PHONE 2 COND	CLOCK OUT
J5	910-045552-001	RIGHT ANGLE JACK, PHONE 2 COND	CLICK OUT
J6	910-046093-005	RIGHT ANGLE DIN CONN 5 PIN DIN	MIDI IN
J7	910-046093-005	RIGHT ANGLE DIN CONN 5 PIN DIN	MIDI THRU
J8	910-046093-005	RIGHT ANGLE DIN CONN 5 PIN DIN	MIDI OUT
Q1	991-041051-002	TRANSISTOR, NPN, SMALL SIGNAL	2N3904
Q2	991-041052-002	TRANSISTOR, PNP, SMALL SIGNAL	2N3906
U1-U4	991-045530-001	IC,CMOS, STATIC RAM, 2K X 8 RET	6116
U5	991-045307-001	IC,NMOS, MEMORY PROM	2532
U6	991-046091-001	IC,USART,INTERFACE	2661B
U7	991-045900-017	IC,TTL, HEX BUFFER, 15V OPEN	7417
U8	991-045900-002	IC,TTL, QUAD 2 INPUT NOR	74LS02
U9	991-045900-004	IC,TTL, HEX INVERTER	74LS04
U10	991-045950-000	IC,TTL, QUAD 2 INPUT NAND	74LS00
U11	991-045950-004	IC,TTL, HEX INVERTER	74LS04
U12	991-045950-026	IC,TTL, QUAD 2 INPUT NAND 30VDC	74LS26
U13-U14	991-042388-001	IC,DUAL VOLTAGE COMPARATOR	LM393
U15	991-045960-503	IC,CMOS, HEX 3 STAGE BUFFER	4503
U16	991-045950-378	IC,TTL, HEX D FLIP FLOP	74LS378
U17	991-045950-026	IC,TTL, QUAD 2 INPUT NAND 30 VDC	74LS26
U18	991-045960-013	IC,CMOS, DUAL TYPE D FLIP FLOP	4013
U19	991-046092-001	IC,OPTO ISOLATOR, FAST DARLINGTON	6N138
(1)	960-046098-001	SWITCH, SLIDE, 1P6T	SPEED SELECTOR
(1)	960-046098-101	SWITCH KNOB	SPEED SELECTOR
(6)	960-046098-002	SWITCH BUTTON, GRAY PLAIN	SEQ. VARIOUS
(1)	964-044082-102	SWITCH BUTTON, GRAY #1	SEQ. LOC. #
(1)	964-044082-104	SWITCH BUTTON, GRAY #2	SEQ. LOC. #
(1)	964-044082-105	SWITCH BUTTON, GRAY #3	SEQ. LOC. #
(1)	964-044082-106	SWITCH BUTTON, GRAY #4	SEQ. LOC. #
(1)	964-044082-107	SWITCH BUTTON, GRAY #5	SEQ. LOC. #
(1)	964-044082-108	SWITCH BUTTON, GRAY #6	SEQ. LOC. #
RXX	852-312XXX-001	RESISTOR, 1/4 WATT 5% CARBON FILM	VARIOUS
RXX	853-42XXX-031	RESISTOR, 1/4 WATT 1% METAL FILM RESISTANCE (XXX) (X) MULTIPLIER	VARIOUS
S1	994-046099-002	RIBBON CABLE, 40 PIN TO S4X	DIG.BD.INTERFACE
S2	996-046090-961	SWITCH CABLE - 4 WIRE MTA	SPEED SELECTOR
S3	994-045894-964	MOD/SEQUENCER LED RATE CABLE	C/A & LSC BDS.
S4	994-045894-998	POWER SUPPLY CABLE SEQUENCER	DMUX P521
			PAGE 146-2 11/23/83

DATE	REVISION	DESCRIPTION
1993-04-08	1	INITIAL RELEASE
1993-04-08	2	REVISION 1
1993-04-08	3	REVISION 2
1993-04-08	4	REVISION 3
1993-04-08	5	REVISION 4
1993-04-08	6	REVISION 5
1993-04-08	7	REVISION 6
1993-04-08	8	REVISION 7
1993-04-08	9	REVISION 8
1993-04-08	10	REVISION 9
1993-04-08	11	REVISION 10
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1993-04-08	98	REVISION 97
1993-04-08	99	REVISION 98
1993-04-08	100	REVISION 99
1993-04-08	101	REVISION 100



NOTE:
1. UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS ARE IN OHMS AND ARE 1/4W 5%
ALL CAPACITORS ARE IN MICROFARADS (uF)
2. 5V VIA A 40 PIN PARALLEL CONNECTOR TERMINATES AT 54K 2. (VCC)
3. 5V VIA A 40 PIN PARALLEL CONNECTOR TERMINATES AT 54K 2. (VCC)
4. 5V VIA A 40 PIN PARALLEL CONNECTOR TERMINATES AT 54K 2. (VCC)
5. 5V VIA A 40 PIN PARALLEL CONNECTOR TERMINATES AT 54K 2. (VCC)
6. 5V VIA A 40 PIN PARALLEL CONNECTOR TERMINATES AT 54K 2. (VCC)
7. 5V VIA A 40 PIN PARALLEL CONNECTOR TERMINATES AT 54K 2. (VCC)
8. 5V VIA A 40 PIN PARALLEL CONNECTOR TERMINATES AT 54K 2. (VCC)
9. 5V VIA A 40 PIN PARALLEL CONNECTOR TERMINATES AT 54K 2. (VCC)
10. 5V VIA A 40 PIN PARALLEL CONNECTOR TERMINATES AT 54K 2. (VCC)

COMPONENT LIST

QTY	DESCRIPTION
1	74LS00
1	74LS04
1	74LS10
1	74LS163
1	74LS161
1	74LS162
1	74LS164
1	74LS165
1	74LS166
1	74LS167
1	74LS168
1	74LS169
1	74LS170
1	74LS171
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SEQUENCER/MIDI BOARD #11
CONNECTOR CHART & ASSEMBLY DRAWING

NEW CONNECTOR CONFIGURATION							
ORIGINATION	DESTINATION	FUNCTION	COLOR/TYPE				
COMMON ANALOG BOARD #2				LSC BOARD #7			
P25-1	P77-2	TUNE	GRAY	P77-1	P113-2	MOD RATE LED	WHITE/BROWN
P25-2	P64-5	HEADPHONE RETURN	CLEAR	P77-2	P25-1	TUNE	GRAY
P25-3	P64-6	SHIELD	SHIELD	P77-3	P516-5	+15 VOLTS	RED
P25-4	P64-8	VOLUME OUT	ORANGE	P77-4	P516-7	-15 VOLTS	BLACK
P25-5	-----	N/C	-----	P77-5	P516-6	+5 VOLTS RAM	WHITE/YELLOW
P25-6	P113-3	SEQUENCER MOD RATE	BROWN	P77-6	P516-8	+5 VOLTS	YELLOW
P26-7	P64-7	MASTER VOLUME RETURN	BLACK	P77-7	P516-10	DIGITAL GROUND	GREEN
DIGITAL BOARD #4				P77-8	P516-3	ANALOG GROUND	WHITE/GREEN
S4X-1	S111-1	SHUTDOWN	RIBBON	SEQUENCER BOARD #11			
S4X-2	S111-2	V-RAM	RIBBON	S111-1 THRU 40	SX4-1 THRU 40	SEE DIGITAL BOARD #4	RIBBON
S4X-3	S111-3	SEQ PORT	RIBBON	S112-4	SW1-1	STEP	WHITE
S4X-4	S111-4	D4	RIBBON	S112-3	SW1-2	96	WHITE/ORANGE
S4X-5	S111-5	D3	RIBBON	S112-2	SW1-3	192	WHITE/BLUE
S4X-6	S111-6	D5	RIBBON	S112-1	SW1-4	GROUND (384)	GREEN
S4X-7	S111-7	D6	RIBBON	S113-3	P25-6	MOD RATE LED	BROWN
S4X-8	S111-8	D2	RIBBON	S113-2	P77-1	MOD RATE LED	WHITE/BROWN
S4X-9	S111-9	D7	RIBBON	S113-1	N/C	-----	-----
S4X-10	S111-10	D0	RIBBON	S114-4	P521-2	+15 VOLTS	RED
S4X-11	S111-11	D1	RIBBON	S114-3	P521-6	DIGITAL GROUND	GREEN
S4X-12	S111-12	RAM4 (ACTIVE LOW)	RIBBON	S114-2	N/C	(-15 VOLTS)	-----
S4X-13	S111-13	RAM1 (ACTIVE LOW)	RIBBON	S114-1	P521-5	+5 VOLTS	YELLOW
S4X-14	S111-14	RAM2 (ACTIVE LOW)	RIBBON				
S4X-15	S111-15	RAM3 (ACTIVE LOW)	RIBBON				
S4X-16	N/C	+5 VOLTS	RIBBON				
S4X-17	S111-17	4 MHz CLOCK	RIBBON				
S4X-18	S111-18	SEQ RATE	RIBBON				
S4X-19	N/C	-15 VOLTS	RIBBON				
S4X-20	S111-20	DIGITAL/GROUND PLANE	RIBBON				
S4X-21	S111-21	ROM	RIBBON				
S4X-22	S111-22	CLK CLK	RIBBON				
S4X-23	S111-23	MEAS CLK (96Hz)	RIBBON				
S4X-24	S111-24	S CLK	RIBBON				
S4X-25	S111-25	MEAS CLK (96Hz)	RIBBON				
S4X-26	S111-26	RD (ACTIVE LOW)	RIBBON				
S4X-27	S111-27	WR (ACTIVE LOW)	RIBBON				
S4X-28	S111-28	NMI (ACTIVE LOW)	RIBBON				
S4X-29	S111-29	A0	RIBBON				
S4X-30	S111-30	A1	RIBBON				
S4X-31	S111-31	A2	RIBBON				
S4X-32	S111-32	A3	RIBBON				
S4X-33	S111-33	A4	RIBBON				
S4X-34	S111-34	A5	RIBBON				
S4X-35	S111-35	A6	RIBBON				
S4X-36	S111-36	A7	RIBBON				
S4X-37	S111-37	A8	RIBBON				
S4X-38	S111-38	A9	RIBBON				
S4X-39	S111-39	A10	RIBBON				
S4X-40	S111-40	A11	RIBBON				
DMUX BOARD #5							
P521-1	N/C	ANALOG GROUND	-----				
P521-2	S114-4	+15 VOLTS	RED				
P521-3	N/C	-15 VOLTS	-----				
P521-4	N/C	N/C	-----				
P521-5	S114-1	+5 VOLTS	YELLOW				
P521-6	S114-2	DIGITAL GROUND	GREEN				

